CLAIMS

What is claimed is:

[c1]   1.   A computer-implemented method for storing information about occurrences of multiple distinct types of events in a single database table having multiple defined fields, each of the event types having multiple parameters, the single database table having an associated metaschema that allows multiple event types to be defined in such a manner that information about occurrences of those event types can be stored in the single database table, the method comprising:

receiving definitions for multiple event types having distinct parameters, the received definitions based on the metaschema;

for each of the multiple event type definitions, mapping each of the multiple parameters for that event type to one of the defined fields of the single database table, the mapping of the parameters for the multiple event type definitions based on the metaschema and such that multiple distinct parameters for multiple defined event types are mapped to one of the defined fields of the single database table; and

for each of a plurality of occurrences of the defined event types, storing information about the occurrence of the defined event type in the single database table by,

receiving values for the parameters for the defined event type that reflect the occurrence; and

storing an indication of the event type occurrence in the single database table in such a manner that the stored indication includes a unique identification of the defined event type and that the received value for each

parameter is stored in the defined field of the single database table to which that parameter is mapped,

so that information about occurrences of multiple types of events can be stored in a single database table by using an associated metaschema to assist in storing values for multiple distinct parameters of multiple defined event types in one of the defined fields.

[c2]   2.   The method of claim 1 wherein the multiple distinct event type parameters that are mapped to the one defined field of the single database table represent differing types of information.

[c3]   3.   The method of claim 2 wherein the differing types of information include string information and numeric information, such that the values for the multiple distinct event type parameters that are stored in the one defined field include at least one string value and at least one numeric value.

[c4]   4.   The method of claim 1 wherein the multiple distinct event type parameters that are mapped to the one defined field of the single database table represent information of a single type but having differing meanings, such that a value for one of the distinct event type parameters has a meaning that is distinct from a meaning of an identical value for another of the distinct event type parameters.

[c5]   5.   The method of claim 1 including:

receiving an indication of one or more event type occurrences having stored indications in the single database table;

retrieving from the single database table the stored values of at least one of the parameters of each of the indicated event type occurrences; and

providing an indication of the retrieved stored values.

[c6]   6.   The method of claim 5 including receiving an indication of a specified type of report, and wherein the provided indication is a generated report of the specified type that is based at least in part on the retrieved values.

[c7]   7.   The method of claim 5 wherein the indicated event type occurrences includes occurrences of multiple types of events.

[c8]   8.   The method of claim 1 wherein each of the defined event types represents a type of interaction with a software program or online service.

[c9]   9.   The method of claim 8 wherein, for one of the defined event types, the occurrences of that one defined event type reflect interactions with multiple software programs, and wherein the stored indication in the single database table for each of the occurrences of that one defined event type includes a unique identification of the software program that was part of the interaction for that occurrence.

[c10]   10.   The method of claim 1 including storing the definitions for the multiple event types in another database table, the stored definitions each including indications of the mappings of the multiple parameters for the event type being defined to the defined fields of the single database table.

[c11]   11.   A computer-implemented method for storing information about events of multiple types using a single event occurrence data structure, the method comprising:

for each of distinct first and second event types, receiving a definition for the event type that indicates at least one parameter for that event type whose values from occurrences of that event type are to be stored, a first

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parameter indicated for the first event type being distinct from a second parameter indicated for the second event type;

associating each of the first and second parameters with a single field of the event occurrence data structure;

receiving an indication of an occurrence of the first event type that includes a value of the first parameter for the indicated occurrence;

receiving an indication of an occurrence of the second event type that includes a value of the second parameter for the indicated occurrence; and

using the event occurrence data structure to store indications of each of the occurrences of the first and second event types, the storing of the indications such that the included values of the first and second parameters are each stored as values of the single field.

[c12]   12.   The method of claim 11 wherein the event occurrence data structure has an associated meta-definition, and wherein the associating of the first and second parameters with the single field of the event occurrence data structure is based at least in part on the associated meta-definition.

[c13]   13.   The method of claim 12 wherein the meta-definition includes an element that is associated with the single field of the event occurrence data structure, and wherein the received definitions for the first and second event types indicate that the first and second parameters are each associated with that element of the meta-definition.

[c14]   14.   The method of claim 12 wherein the event occurrence data structure is a database table, and wherein the meta-definition is a metaschema associated with the database table.

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[c15]   15.   The method of claim 12 including storing indications of the received definitions in a format specific to the meta-definition.

[c16]   16.   The method of claim 11 including:

receiving one or more indications of one or more event type occurrences having stored indications; and

retrieving in a consistent manner the stored values of the single field for the indicated event type occurrences, the retrieved values including values for the first and second parameters.

[c17]   17.   The method of claim 16 including receiving an indication of a specified type of report, and providing an indication of a generated report of the specified type that is based at least in part on the retrieved values.

[c18]   18.   The method of claim 11 wherein each of the defined event types represents a distinct type of interaction with and/or use of a software program.

[c19]   19.   The method of claim 18 wherein the event types are dynamically defined after creation of the software program.

[c20]   20.   The method of claim 18 wherein the software program is not designed to store indications of the occurrences of at least one of the first and second event types.

[c21]   21.   The method of claim 11 wherein each of the defined event types represents a distinct type of interaction with and/or use of an online service.

[c22]   22.   The method of claim 21 wherein the online service is not designed to store indications of the occurrences of at least one of the first and second event types.

[c23]   23.   The method of claim 11 wherein the received definitions for the first and second event types are from distinct software programs.

[c24]   24.   The method of claim 11 including receiving indications of occurrences of the first event type for each of multiple software programs, and using the event occurrence data structure to store indications of each of the indicated occurrences in such a manner that the received values for the first parameter for each of those occurrences are stored as values of the single field.

[c25]   25.   The method of claim 11 wherein the storing of the information about the events of multiple types is performed as a system service to one or more distinct software programs.

[c26]   26.   The method of claim 11 wherein the values of the first parameter are of a distinct type of information than the values of the second parameter.

[c27]   27.   The method of claim 11 wherein the received definition for the first event type includes one or more specified restrictions on values of the first parameter.

[c28]   28.   The method of claim 27 wherein the storing of the indication of the occurrence of the first event type includes, before storing the value of the first parameter as a value of the single field, verifying that the value of the first parameter satisfies the specified restrictions.

[c29]   29.   The method of claim 11 wherein the received definition for the first event type includes authorization information that restricts use of the first event type.

[c30]   30.   The method of claim 29 wherein the receiving of the indication of the occurrence of the first event type includes receiving authorization information, and wherein the storing of the indication of the occurrence of the first event type includes, before storing the value of the first parameter as a value of the single field, verifying that the received authorization information satisfies the included authorization information.

[c31]   31.   The method of claim 29 including receiving a request for stored information for the indicated occurrence of the first event type, and before supplying the requested stored information, verifying that authorization information received with the request satisfies the included authorization information.

[c32]   32.   The method of claim 11 wherein the storing of the indications of each of the occurrences of the first and second event types includes storing an indication of the event type.

[c33]   33.   The method of claim 32 including determining distinct IDs that are associated with the first and second event types, and wherein the stored indications of the event types are the distinct IDs.

[c34]   34.   The method of claim 11 including receiving definitions for multiple other event types and associating at least one parameter indicated for each of the other event types with the single field of the event occurrence data structure.

[c35]   35.   A computer-readable medium whose contents cause a computing device to store information about events of multiple types using an event occurrence data structure having fields, by performing a method comprising:

receiving definitions for event types, each definition indicating a type of information to be stored for occurrences of that event type;

for each of a plurality of defined event types, receiving an indication of an occurrence of the event type that includes information of the type indicated by the definition for that event type; and

storing indications of each of the occurrences in the event occurrence data structure, the stored indications such that the information included in the received occurrence indications of the types indicated by the definitions for the event types are stored in the same field of the event occurrence data structure.

[c36]   36.   The computer-readable medium of claim 35 wherein the types of information indicated by the event type definitions correspond to differing parameters of those event types, and wherein the included information of the types indicated by the definitions for the event types are parameter values for those parameters.

[c37]   37.   The computer-readable medium of claim 35 wherein the event occurrence data structure has an associated meta-definition, and wherein the method includes associating the types of information indicated by the event type definitions with the same field of the event occurrence data structure based at least in part on the associated meta-definition.

[c38]   38.   The computer-readable medium of claim 35 wherein the computer-readable medium is a memory of a computing device.

[c39] 39. The computer-readable medium of claim 35 wherein the computer-readable medium is a data transmission medium transmitting a generated data signal containing the contents.

[c40] 40. The computer-readable medium of claim 35 wherein the contents are instructions that when executed cause the computing device to perform the method.

[c41] 41. A computing device for storing information about events of multiple types using a single event occurrence data structure, comprising:

an event type definer component that is capable of receiving definitions for each of distinct first and second event types that indicate parameters specific to those event types whose values from occurrences of those event types are to be stored, and of associating each of the indicated parameters with a field of the event occurrence data structure based on a meta-definition associated with the event occurrence data structure, the associating such that a first of the parameters indicated for the first event type and a distinct second of the parameters indicated for the second event type are each associated with a single field of the event occurrence data structure; and

an event occurrence information storer component that is capable of receiving an indication of an occurrence of the first event type that includes values for the parameters indicated for the first event type, of receiving an indication of an occurrence of the second event type that includes values for the parameters indicated for the second event type, and of storing indications of each of the occurrences of the first and second event types in such a manner that the included values for the first and second parameters are each stored as values of the single field.

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[c42]   42.   The computing device of claim 41 including an event occurrence information retriever component that is capable of receiving indications of one or more of the event type occurrences having stored indications and of retrieving in a consistent manner the stored values of at least the single field for the indicated event type occurrences.

[c43]   43.   The computing device of claim 41 wherein the values of the first parameter are of a distinct type of information than the values of the second parameter.

[c44]   44.   The computing device of claim 41 wherein the event type definer component and the event occurrence information storer component are executing in memory of the computing device.

[c45]   45.   A computer system for storing information about events of multiple types using a single event occurrence data structure, comprising:

          means for receiving definitions for each of distinct first and second event types that indicate at least one type of information to be stored for occurrences of each of the event types, a first type of information indicated for the first event type being distinct from a second type of information indicated for the second event type, and for associating each of the first and second types of information with a single field of the event occurrence data structure;

          means for receiving an indication of an occurrence of the first event type that includes information of the first type and receiving an indication of an occurrence of the second event type that includes information of the second type; and

          means for using the event occurrence data structure to store indications of each of the occurrences of the first and second event types, the

storing of the indications such that the received information of the first and second types are each stored as values of the single field.

[c46]   46.   A computer-implemented method for storing information about events of multiple types using a single event occurrence data structure having multiple fields, the method comprising:

retrieving a meta-definition that specifies how values of distinct parameters for multiple distinct event types can be stored using a single event occurrence data structure;

for each of multiple distinct event types,

receiving a definition for the event type indicating parameters that are specific to the event type and whose values from occurrences of that event type are to be stored; and

mapping the indicated parameters for the event type to the fields of the single event occurrence data structure based on the retrieved meta-definition;

receiving indications of multiple occurrences of the defined event types, each indicated occurrence of an event type including values for the parameters indicated for that event type; and

storing indications of each of the indicated occurrences by, for each of the parameters indicated for the event type whose occurrence is indicated, storing the included value for the parameter from the occurrence in the field of the event occurrence data structure to which the parameter is mapped.

[c47]   47.   The method of claim 46 wherein the retrieved meta-definition is specific to the event occurrence data structure.

[c48]   48.   The method of claim 46 wherein multiple distinct parameters of multiple defined event types are mapped to a single field of the event occurrence data structure.

[c49]   49.   The method of claim 46 wherein multiple distinct parameters whose values are of differing types of information are mapped to a single field of the event occurrence data structure.

[c50]   50.   A computer-implemented method for retrieving stored information about occurrences of multiple defined event types, each of the event types having one or more parameters whose values from occurrences of that event type are stored in one or more of multiple fields of an event occurrence data structure, the method comprising:

receiving an indication of one or more occurrences of one or more of the event types, each indicated occurrence of an event type having one or more values for parameters of that event type that are stored in one or more of the fields of the event occurrence data structure;

retrieving mapping information for each of the one or more event types whose occurrences are indicated, the mapping information for an event type indicating fields of the event occurrence data structure that are associated with the parameters of that event type;

for each of the indicated occurrences of an event type, extracting values for at least one of the parameters of that event type for that occurrence from the one or more fields of the event occurrence data structure that are indicated for those parameters by the mapping information for that event type; and

providing an indication of the extracted values.

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[c51]   51.   The method of claim 50 wherein one of the fields of the event occurrence data structure stores values for multiple distinct parameters of multiple distinct event types.

[c52]   52.   The method of claim 51 wherein the values of the multiple distinct parameters are of differing types of information.

[c53]   53.   The method of claim 50 wherein the received indications of the occurrences of the event types include indications of one or more parameters of the event types, and wherein the extracting of the values is performed for the indicated parameters.

[c54]   54.   The method of claim 50 wherein the event occurrence data structure has an associated meta-definition, and wherein the retrieved mapping information is based at least in part on the associated meta-definition.

[c55]   55.   The method of claim 54 wherein the event occurrence data structure is a database table, and wherein the meta-definition is a metaschema associated with the database table.

[c56]   56.   The method of claim 50 including receiving an indication of a specified type of report, and wherein the provided indication of the extracted values is a report of the specified type that is based at least in part on the extracted values.

[c57]   57.   A computer-implemented method for reporting about occurrences of multiple defined event types, each of the occurrences having corresponding information stored in an entry of an event occurrence data structure, the method comprising:

receiving an indication of a report to contain information about one or more of the event types;

for each of the one or more event types, determining the entries of the event occurrence data structure that store information about occurrences of those event types;

retrieving from the determined entries at least some of the stored information about the occurrences of the one or more event types;

generating the indicated report based at least in part on the retrieved occurrence information; and

providing an indication of the generated report.

[c58]   58.   The method of claim 57 wherein the received indication of the report specifies one or more occurrences of the one or more event types, and wherein the entries of the event occurrence data structure that are determined store information about the specified occurrences.

[c59]   59.   The method of claim 57 wherein one of the fields of the event occurrence data structure stores values for multiple distinct parameters of multiple distinct event types, and wherein the retrieving of the stored information about the occurrences includes retrieving values of that one field.

[c60]   60.   The method of claim 59 wherein the values of the multiple distinct parameters are of differing types of information.

[c61]   61.   The method of claim 57 wherein the event occurrence data structure has an associated meta-definition, and wherein the determining of the entries and/or the retrieving of the stored information are based at least in part on the associated meta-definition.

[c62]   62.   The method of claim 61 wherein the event occurrence data structure is a database table, and wherein the meta-definition is a metaschema associated with the database table.

[c63]   63.   A method for storing information about occurrences of multiple defined event types using an event occurrence data structure, the method comprising:

for each of a plurality of defined event types,

receiving information reflecting an occurrence of the event type that includes values for one or more parameters specific to that event type;

determining based on a definition for the event type one or more fields of the event occurrence data structure in which the included values of the parameters for that event type are to be stored; and

storing the received information in the event occurrence data structure in such a manner that the included values of the parameters for the event type are stored as values of the determined fields.

[c64]   64.   The method of claim 63 wherein one of the fields of the event occurrence data structure stores values for multiple distinct parameters of multiple distinct event types.

[c65]   65.   The method of claim 64 wherein the values of the multiple distinct parameters are of differing types of information.

[c66]   66.   The method of claim 63 wherein the event occurrence data structure has an associated meta-definition, and wherein the determining of the one or more fields of the event occurrence data structure is based at least in part on the associated meta-definition.

[c67]   67.   The method of claim 66 wherein the event occurrence data structure is a database table, and wherein the meta-definition is a metaschema associated with the database table.

[c68]   68.   A computer-implemented method for processing information about events of multiple types in a consistent manner by using an event type meta-definition, the method comprising:

          receiving definitions for multiple distinct event types, each event type having one or more parameters that each receive values for occurrences of that event type;

          applying the event type meta-definition to the received definitions so as to associate parameters for multiple event types together, the associated parameters representing different information;

          receiving requests to process information about multiple occurrences of the defined event types; and

          processing values for the different information represented by the associated parameters from the multiple occurrences of multiple event types in a consistent manner based on the event type meta-definition.

[c69]   69.   The method of claim 68 wherein the values of the associated parameters are of differing types of information.

[c70]   70.   The method of claim 68 wherein the associated parameters are mapped to a single field of an event occurrence data structure such that the values of the associated parameters are all stored as values of the single field.

[c71]   71.   The method of claim 68 wherein the received requests to process information about the multiple occurrences of the defined event types are to store information about the occurrences, and wherein the processing of the values for the different information represented by the associated parameters from the multiple occurrences includes storing those values in such a manner as to be associated together.

[c72]   72.   The method of claim 68 wherein the received requests to process information about the multiple occurrences of the defined event types are to retrieve stored information about the occurrences, and wherein the processing of the values for the different information represented by the associated parameters from the multiple occurrences includes retrieving those stored values in a consistent manner.

[c73]   73.   The method of claim 68 wherein the received requests to process information about the multiple occurrences of the defined event types are to generate one or more reports including information about the occurrences, and wherein the processing of the values for the different information represented by the associated parameters from the multiple occurrences includes generating the one or more reports based on those values in a consistent manner.

[c74]   74.   One or more computer memories collectively containing a data structure that stores information about occurrences of multiple event types, each event type having one or more attributes specific to that event type such that an occurrence of that event type is represented by a group of values for those

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attributes, the values for the attributes of a first of the event types differing in type of information from the values for the attributes of a second of the event types, the data structure comprising a multiplicity of entries each corresponding to an occurrence of an event type and each having values for at least first and second fields of the data structure, each entry comprising:

a stored value for the first field that uniquely identifies the event type for the occurrence; and

one or more stored values for the second field that are the group of values for the attributes of the identified event type, the one or more stored values obtained from the occurrence,

and wherein the data structure contains an entry corresponding to an occurrence of the first event type and an entry corresponding to an occurrence of the second event type, such that the values stored for the second field differ in the type of information in those data structure entries.

[c75]   75.   The computer memories of claim 74 wherein the data structure is a single database table.

[c76]   76.   The computer memories of claim 74 including a second data structure used to store definitions for the multiple event types in a format specific to a meta-definition for the data structure storing the information about the occurrences, each of the stored event type definitions associating the attributes specific to the event type being defined with the second field of the data structure.

[c77]   77.   The computer memories of claim 74 wherein the values for at least one of the attributes of a first of the event types being of a string type of information and the values for at least one of the attributes of a second of the event types being of a numeric type of information.